University of Virginia BUILDING ENERGY MODELING and REPORTING STANDARDS

Summary

The University of Virginia Building Energy Modeling and Reporting Standards detail the expectations and requirements for developing and sharing building energy models in compliance with the UVA Green Building Standards (i.e., UVA Facility Design Guidelines, Appendix G). The requirements below are also summarized in a companion spreadsheet here.

For more information, including updates, visit:
https://sustainability.virginia.edu/resources/current-uva-green-building-standards

1. GENERAL REQUIREMENTS

The standards and requirements presented herein **apply to all Capital Projects for which LEED certification is already required**. Projects pursuing prescriptive energy performance compliance (LEED EA Credit Optimize Energy Performance Option 2 or Option 3) in lieu of energy modeling-based compliance are exempt from these standards. The intent of these standards is to align with, and supplement industry best practices as outlined in **ASHRAE Standard 209-2018** and **ASHRAE Standard 90.1-2016, Appendix G**. Reference these resources as needed for additional information and context.

2. BUILDING ENERGY SIMULATION PROGRAMS

Whole building energy models shall be developed in EnergyPlus, IES-VE, or equivalent (DOE-2 is considered to be superseded by EnergyPlus), with a preference for models developed with OpenStudio suite. In-house modeling methods will not be accepted, except for applications which cannot otherwise be modeled using one of the aforementioned software packages. A working executable file(s) shall be submitted to the UVA Office for Sustainability at the completion of the project.

3. ENERGY MODELING MILESTONES

The following energy modeling exercises shall be completed during each design phase.

Pre-design

- Develop a *simple box energy model* to evaluate the following:
  - Building massing and geometry
  - Window to wall ratio and solar shading
  - Envelope construction
  - Design compliance with Building Energy Performance Requirement
- Provide energy modeling inputs and results to the Office for Sustainability at least once during and at the completion of the pre-design phase.

Schematic design

- Develop a *whole building energy model* to evaluate the following:
  - Window to wall ratio and solar shading
  - Envelope construction
  - HVAC systems
  - Lighting and daylighting
  - Outside air delivery and heat recovery strategies
  - Passive energy conservation strategies
  - Design compliance with Building Energy Performance Requirement
- Integrate results with UVA Life Cycle Cost Calculator to provide total cost of ownership metrics.
- Provide energy modeling inputs and results to the Office for Sustainability at least once during and at the completion of the SD phase.

Preliminary design

- Continuously update the *whole building energy model* to reflect design evolution and evaluate the effects of large design changes.
- Confirm the design maintains compliance with the Building Energy Performance Target.
- Integrate results with UVA Life Cycle Cost Calculator to provide total cost of ownership metrics.
- Provide energy modeling results and life cycle cost impacts when evaluating cost-saving measures during value management sessions.
- Provide energy modeling inputs and results to the Office for Sustainability at least once during and at the completion of the PD phase?

Construction documents

- Update *whole building energy model* to reflect as-built conditions.
- Share energy modeling inputs, results, and full executable model and all associated files with the UVA Office for Sustainability.

4. ENERGY MODELING INPUTS

- See table / spreadsheet template here.

5. ENERGY MODELING OUTPUTS AND RESULTS

- See table / spreadsheet template here.

6. LEED DISTRICT ENERGY SYSTEM MODELING ASSUMPTIONS

Energy System	Plant Efficiency	Thermal Distribution Losses	Pumping Energy
Chilled Water	4.4 COP	5%	Included in coefficient of performance (COP).
Medium Temperature Hot Water (MTHW)	83%	10%	TBD
Low Temperature Hot Water (LTHW)	83%	10%	TBD
Steam	83%	15%	TBD